DC POWER SUPPLY
(MOTOROLA MODEL:
S1303A-1)
MODEL: 2079A

Ratelco, INC.

610 Pontius Avenue N. • Seattle, Washington 98109
Phone 206-624-7770

ELECTRONICS MANUFACTURERS
Alternator Power Converters • Power Supplies • Automatic Battery Chargers
Industrial Transistor Amplifiers
Antennas • Communications Accessories • Marine Products

Ratelco

DC POWER SUPPLY
(MOTOROLA MODEL: S1303A-1)
MODEL: 2079A

OPERATING and SERVICE MANUAL

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WARRANTY

RATELCO warrants items of their manufacture to be free of defects in both materials and workmanship for a period of one year from date of sale, except for vacuum tubes and/or sub-assemblies manufactured by others which are governed by the standard warranty of the original manufacturer. This warranty does not extend to any unit which has been subjected to misuse, neglect, accident or improper installation. Repair of the unit or replacement of a defective part will be made only if the defective unit or part is returned, transportation prepaid, to the factory; and if upon the judgment of the factory, it was defective at the time of purchase or failed through normal use.

If there is any question as to the proper functioning of the unit or any component thereof, please consult the agency through whom it was purchased. If said agency is not readily available, or cannot supply the information desired, correspondence direct with the factory is invited. Be sure to include both model and serial number.

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PRELIMINARY INSTRUCTION SHEETS

PORTABLE POWER SUPPLIES

MODEL TABLE

MODEL	SUFFIX	DESCRIPTION
S1303A	-1	Unit with 1-18 VDC OUTPUT
S1305A	-1	Unit with 1-15 or 1-40 VDC OUTPUT
S1305A	-1	Same as S1305A-1 with 230VAC 50Hz INPUT

1. INTRODUCTION

These S1303A and S1305A power supplies are used for testing transistorized mobile and portable two-way radios with primary current requirements of up to 40 amperes. These units have voltage regulation and current-limiting circuitry up to a peak current of 40 amps. They are equipped with removable control units containing volt and amp meters. The control unit can be mounted separately from the main power source by using a model SKN6015A Remote Cable Kit. In addition, a SLN6317A Rack-Mount Kit allows mounting of the power supply in a 19 inch rack cabinet.

These units may be used to simulate actual operating conditions by applying slightly higher or lower than recommended operating voltages. This procedure may serve as an aid in locating intermittent faults.

2. DESCRIPTION

The models S1303A and S1305A are are continuously variable power supplies. The model S1303A will supply operating power to radios requiring a DC input of 1-18 volts and the model S1305A will supply operating power to radios requiring from 1 to 40 volts DC input. In both models the current is limited to 20 amps continuous and 40 amps intermittent (maximum 1 minute in 5 minute intervals) with the output voltage between 1 and 15 volts. Above 15 volts the current must be limited as shown in the diagram on the front panel to provide a maximum power output of 300 watts continuous or 600 watts intermittent. With the model S1305A at high current outputs (over 20 amps) the low voltage range should be used whenever the output voltage is less than 18 volts.

The ripple content is low enough to be used with any mobile radio. These power supplies contain a Standby-On switch that allows the output to be turned off without turning off the entire unit and fan. The switch at the lower left hand corner is used to turn off the unit and fan. This switch is also used in the model S1305A to select 1-15 volts or 1-40 volts output.

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3. OPERATION

a. Voltage Control

When testing a radio, turn the STANDBY-ON switch to the ON position and set the voltage control to the desired output. When test is completed, return the switch to the STANDBY position.

b. Current Limiter Control

This control is used to limit the current to the radio under test. The unit will hold the current output to within one ampere of the desired level. The current limiting level is set by turning the current limiting control in a counter-clockwise direction until the voltage starts to fall (as indicated on the panel voltmeter). If the mobile radio under test exceeds the preset current level, the voltage will drop automatically, limiting the current output to the preset value.

c. Transistor Protection Circuitry

The power supplies have protection circuitry which turns the output off in case of short circuit in the series regulator. This will protect the device under test from over-voltage damage. This circuit also restricts the 1-18 volt range on the model S1305A to 20 volts maximum. If an attempt is made to advance the voltage control beyond 20 volts in the low range of if the unit is switched from the high range to the low range while the output is greater than 20 volts the output will go to zero.

To restore operation reduce the voltage setting to less than 18 volts and then switch the unit off and back on.

4. INSTALLATION

a. Place power supply in any convenient location that does not obstruct the air vents.

b. Connect the power cord to a 110-120 volt AC source.

c. Connect the equipment to be powered to the DC receptables on the front panel with heavy wire. Number 10 is the minimum recommended wire size for most applications. NOTE: Be sure of proper polarity when making connections to the equipment (RED-POSITIVE, BLACK-NEGATIVE).

d. CAUTION: Improper use of the power supply as a battery charger can cause extensive damage to the power supply. In an emergency the S1303A and S1305A can be used to charge a battery as long as the following steps are adhered to.

1. Disconnect all load from the power supply.

2. Turn the power supply on and set the voltage control so that that the output voltage is at the desired voltage.

3. Connect the battery to the output using a 20 amp fuse between the power supply and battery.

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4. Check the current limiter for a maximum of 20 amps to prevent exceeding the intermittent rating of the power supply.

5. Do not turn the voltage control below battery voltage to prevent damage to the voltage control pot.

5. Deviant operation can be expected if the power supply is positioned in the vicinity of a transmitter antenna. The antenna should be positioned at least 25 feet from the power supply or the supply shielded from the antenna by a ground plane at radio ground potential.

6. GUARANTEED PERFORMANCE SPECIFICATIONS

Models	S1303A	S1305A
DC OUTPUT	1-18 VDC	1-15 VDC or 1-40 VDC
METERING ACCURACY	± 2% full scale	
CURRENT CAPACITY	20 amps continuous at 1-15 volts DC	40 amps intermittent
	300 watts continuous over 15 volts DC	600 watts intermittent
RIPPLE CONTENT	10 millivolts nominal in continuous range	
REGULATION	± 15% mV in continuous range, ± 1% +40 mV in intermittent range	
OVERALL DIMENSIONS	13½" High, 8" Wide, 15" Deep	
WEIGHT	41 lbs. net	
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE		

7. DATE INCLUDED

Model S1303A Portable Power Supply Schematic Diagram 63D81059A36

Model S1305A Portable Power Supply Schematic Diagram 63D81059A37

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TROUBLE SHOOTING GUIDE

MODEL S1303A-1 & S1305A-1

NOTE

Unless otherwise indicated all voltages are given with the voltmeter connected to the positive DC output. (The resistance of the meter should be at least 20,000 Ω/V).

1. NO DC OUTPUT

1.1 Cycle the on-off switch, if this has not started the unit check the AC line and fuse. If the line voltage is correct remove the lefthand side panel. Measure the voltage from the pass-transistor heatsink to the positive DC output. If the voltage is greater than 8.0 volts go to Paragraph 7.

1.2 If the voltage is close to zero turn the AC off and remove the base and emitter connections at each of the (-6) pass-transistors. The base connection is one end of a 1 ohm, 1 watt resistor (-23), the emitter connection is a piece of bare buss wire. Turn the unit back on and measure the voltage again. If the voltage is close to zero, reconnect the pass-transistors and go to Paragraph 10.

1.3 If the voltage is greater than 8.0 volts measure the voltage at the base pin of each of the (-6) transistors. If any base voltage is greater than a few tenths of a volt that transistor is bad and must be replaced. If no base voltages check over 0.5 volt, reconnect each emitter until the output voltage goes high and falls off. Replace the transistor.

NOTE

At the time of manufacture the pass-transistors are installed in matched sets. If a single transistor must be replaced, request the transistor from Ratelco, Inc., giving the two digit number marked on the case with a marking pen.

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2. HIGH MINIMUM DC OUTPUT VOLTAGE

2.1 Make the checks in paragraphs 1.2 and 1.3 for a leaky pass transistor.

3. REDUCED CURRENT OUTPUT CAPACITY

3.1 Check the voltage between pass transistor heatsink and positive output jack with unit under 5-10 amp load. This voltage should be greater than 8 volts; if not, go to paragraph 11.1.2.

3.2 With a 5 to 20 amp load at any convenient voltage, measure the emitter voltage at each of the pass-transistors (TP22-TP25). The emitter pin is the pin with a bare wire connecting it to the terminal strip The four emitter voltages should read within 50 mv of each other. If not, replace the transistor (s) with low voltage at the emitter. The transistors are installed by the manufacturer in matched sets so to be sure of optimum performance, the transistor should be replaced by requesting a transistor (from Ratelco, Inc.) with a number the same as that written on the bad transistor.

3.3 If no bad transistor is found or upon replacement of a bad transistor, go to paragraph 9.

4. POOR REGULATION

4.1 With the voltage control turned down, check the voltage across the pass transistors (TP26). If the voltage at TP26 varies with load more than a volt or so, check the -55 and -58 trimmers for intermittent contact at the wiper. This is evidenced by poor regulation and a possible maximum output current of 5 to 20 amps.

5. EXCESSIVE RIPPLE

5.1 When the output current is being limited by the current limiter the ripple content of the output will increase. If the current limiter is not in operation and there is greater than 10 mv ripple RMS in the output, measure the voltage across the pass-transistors with the load connected.

5.2 If the voltage across the pass-transistors is less than 9.0 volts, check paragraphs 4.1, 10, and 11.7.

6. AC INPUT FUSE BLOWS WHENEVER THE UNIT IS TURNED ON

6.1 Check SCR's for short circuit. If SCR (s) shorted, replace SCR (s) and pulse transformer (-87). Also check unijunction transistor for defect.

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7. REGULATOR CIRCUIT

7.1 Check the voltage at TP4 on the circuit board. If the voltage is less than 18 volts, disconnect either end of the 18 volt zener diode (-86) and measure the voltage at TP4 again. If the voltage is greater than 18 volts, replace the zener. If the voltage is still less than 18 volts, reconnect the zener and disconnect either end of the 250 mFd capacitor (-73) and measure the voltage again. If the voltage is still less than 18 volts, replace the μA723C integrated circuit (-51). If the voltage increases to over 18 volts, replace the (-73) capacitor.

7.2 TP11 and TP16 should be approximately 3.3 volts. With the standby switch out of standby and the output voltage greater than 2.0 volts, there should be less than 0.01 volts difference between TP16 and TP11. If TP16 has a higher voltage than TP11, then TP9 should be less than 5.0 volts, if not, replace the integrated circuit. If TP11 is greater than TP16, TP9 should be greater than 0.7 volts.

8. CURRENT LIMITER

8.1 Check the voltage at TP11. This voltage must be greater than 3.0 volts. If less than 3.0 volts, check the voltage at the cathode end of the 1N4148 diode (-82B). If this voltage is greater than 3.0 volts, go to paragraph 7.

8.2 Check the voltage between TP5 and TP7. This DC voltage will be in the order of 1 to 600 mv. If the voltage at TP5 is greater than the voltage at TP7 by over 2-5 mv, the power supply must be current limiting; if not, change the μA741C integrated circuit.

9. AMMETER ADJUSTMENTS

9.1 For best results 2 ammeters are necessary, a 0-50 amp and a 0-5 amp meter. The adjustment trimmer for the power supply ammeter is mounted on the circuit board attached to the rear of the voltmeter in the control head. There are two trimmers in the Model S1305A; one for the ammeter and one for the 0-40 volt range of the voltmeter. The Model S1303A has only the ammeter adjustment trimmer.
40 amp jacks and adjust the current trimmer so that the internal and external ammeters agree. The 0-4 amp range is adjusted by changing the length of the nichrome wire between the small and large DC positive jacks. After adjusting the power supply ammeter, connect a load drawing up to 4 amps from the small jacks and adjust the length of the nichrome wire resistor until the internal and external ammeters agree.

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WARNING

The fuse holder has 117 VAC on it even with the power switch in the off position. To prevent shock hazard, remove the line cord from the socket before attempting to adjust the nichrome wire resistor. Also make absolutely certain that the nichrome wire has at least 1/2" clearance around it.

10. FIRING CIRCUIT

10.1 Position the standby switch in the UP position, the current limiter to the extreme clockwise (40 amp) position and the voltage control knob to 1 volt.

10.2 Measure the voltage at TP20. If it is less than 19 volts, disconnect the anode end of the 24 volt zener (-83) and check the voltage again. If is is greater than 19 volts, replace the zener diode (-83), if it is less than 19 volts, check TP3. It TP3 is greater than 30 volts, go to paragraph 11. If TP3 is less than 30 volts, check the (-3) diodes for defect and the line voltage for greater than 108VAC.

10.3 If the voltage at TP26 is close to zero volts, check paragraph 1.2 and if no discrepancy is found, put an oscilloscope across the 15 ohm resistor in the gate circuit of the SCR. Turn the unit off and then back on to see if there is a gate pulse to the SCR at the instant the unit is turned on. To fire the SCR a pulse of greater than 3.0 volts is required. If the pulse is less than 3.0 volts, replace the unijunction transistor (-90). If there is no pulse, check TP21 with the scope probe for a wave form as given in Fig. 1e. If the voltage at TP26 is close to zero the wave form at TP21 will consist of only 3 or 4 pulses each time the unit is turned on. In order to fire the SCR these pulses should be at least 12 volts. If the pulses are less than 12 volts, replace the (-90) unijunction transistor and check the -50A and 50B transistors for defect.

10.4 If the pulse at the gates exceed 3.0 volts but the SCR does not fire, replace the SCR's. If there is a pulse at TP21 but none at the SCR gate, check the lead from connector (-39_ pin #9 to gate for continuity; if OK replace the pulse transformer (-87).

11. CIRCUIT BOARD ADJUSTMENT

Normally readjustment of the circuit board trimmers would be required only after replacing a defective component.

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CAUTION

Extreme maladjustment of the circuit board trimmers may cause damage to the power supply. For this reason breaking the factory seals on the trimmers may in some cases void the warranty.

11.1 Firing Circuit Adjustment

11.1.1 Trimmers (-55 and (-58) are used to adjust the firing circuit. The voltage at TP26 is controlled by trimmer (-58) and the firing angle is controlled by trimmer (-55).

11.1.2 Monitor TP26. (Pass-transistor heatsink to positive DC output) with a voltmeter and connect an oscilloscope between positive DC output and TP3. The voltage at TP26 should not exceed 11.5 volts when the SCR's are firing. It may be noted that there are excursions of voltage above 15 volts at times but at these times the SCR's should have ceased firing and the voltage will drift down until the SCR's fire.

11.1.3 Remove all load from the unit and turn the voltage control knob to its extreme counter-clockwise position. By incrementally adjusting trimmers (-55) and (-58) the voltmeter should fluctuate between 10.5 and 11.5 volts. The oscilloscope wave form will appear as in Fig. 1a, possibly with only 2 or 3 firings per second. If the wave form appears as in Fig. 1b there will be poor regulation at 14-18 volt and 40 amp output. For a more precise adjustment the unit must be returned to the manufacturer.

11.2 Voltage Adjustment

11.2.1 The output voltage range is adjusted with trimmer (-63). The upper voltage limit adjustment is made by turning the 2.5k (-72) trimmer until the desired voltage is reached with the voltage control fully clockwise.

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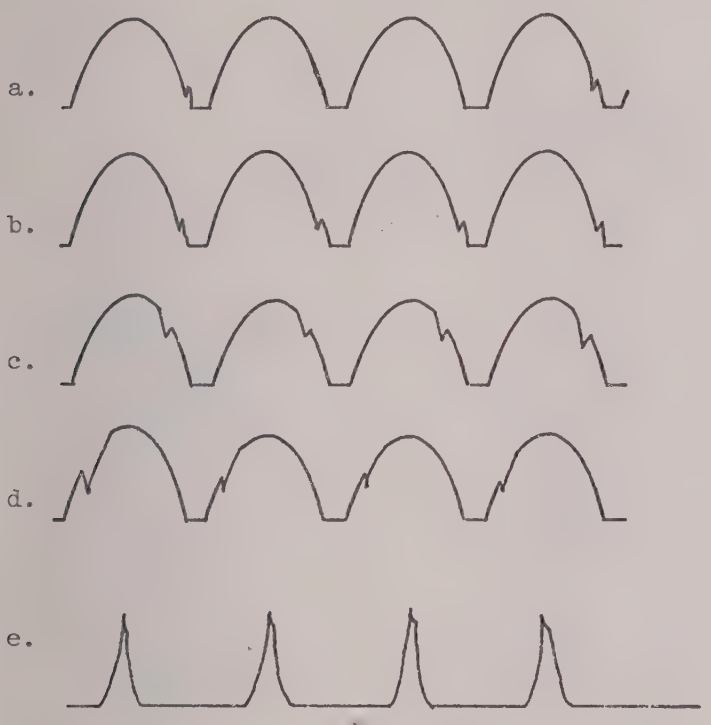

Output 1 volt
0-2 amp load

Output 1 volt
no load

Output 15 volts
1-5 amp load

Output 15 volts
35-40 amp load

Wave form at TP21
with 0 current
1 volt output

FIG. 1.

11.3 Current Limiter Adjustment

11.3.1 After performing the ammeter checks in 9.1, the power supply ammeter may be used to set the current limiter. Connect a load capable of drawing at least 4.5 amps across the small output jacks. Turn the current limiter control to the 4 amp position and the voltage control clockwise until the maximum current is being drawn (do not exceed 5 amps). Turn the 5k (-71) trimmer fully counter-clockwise. Adjust the 1k (-72) trimmer until the ammeter reads 2.0 amps. Rotate the 5k (-71) trimmer clockwise until the ammeter reads 4.2 amps. Turn the current limiter control to zero; the current should not exceed 100 mA. If more precise limits are desired the two trimmers can be "tweaked" to the desired setting.

12. VOLTAGES AT VOLTAGE TEST POINTS

Measured with STANDBY switch up and with voltage and current limiter controls in mid-range.

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NOTE

All voltages are given with the voltmeter negative connected to the positive output (red) jack. The internal resistance of the meter must be at least 20,000 Ω/V.

Test Point	Voltage	Possible Malfunction
TP-1	0.1 to 0.4 VDC	Paragraph 4.1, 10.3
TP-2	10 to 20 VDC	Paragraph 4.1, 11.1
TP-3	32 - 35 VDC	Paragraph 1.1
TP-4	18V ±10%	Paragraph 7.2
TP-5	3.5V ±10%	
TP-6	3.5V ±10%	Paragraph 8
TP-7	3.5V ±10%	Paragraph 8
TP-8	1.3 - 2.0	Paragraph 7.2
TP-9	1.3 - 2.0	Paragraph 7.2
TP-10	7.0 - 11.0 VDC	Paragraph 1
TP-11	3.0 - 3.5 VDC	Paragraph 7.2
TP-12	Depends on output voltage + 2.5 to 25.0	
TP-13	3.5V ±10%	Paragraph 8.3
TP-14	0 - 0.4 VDC	Paragraph 8.2
TP-15	7.0 ±5%	IC (-51)
TP-16	3.0 - 3.5	Paragraph 7.3
TP-17	10.0 - 18.0 volts	Standby switch out of STANDBY
TP-18	Same as TP-17	Standby switch out of STANDBY
TP-19	2.5 - 3.3 VDC .63	Paragraph 5.1
TP-20	18 to 24 VDC	Paragraph 10.2
TP-21	2.0 - 7.0	Paragraph 10.1
TP-22 thru TP-25	0.0 to 0.4 depending on output current	Paragraph 3
TP-26	7.0 to 11.0 volts	Paragraph 1

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PARTS LIST

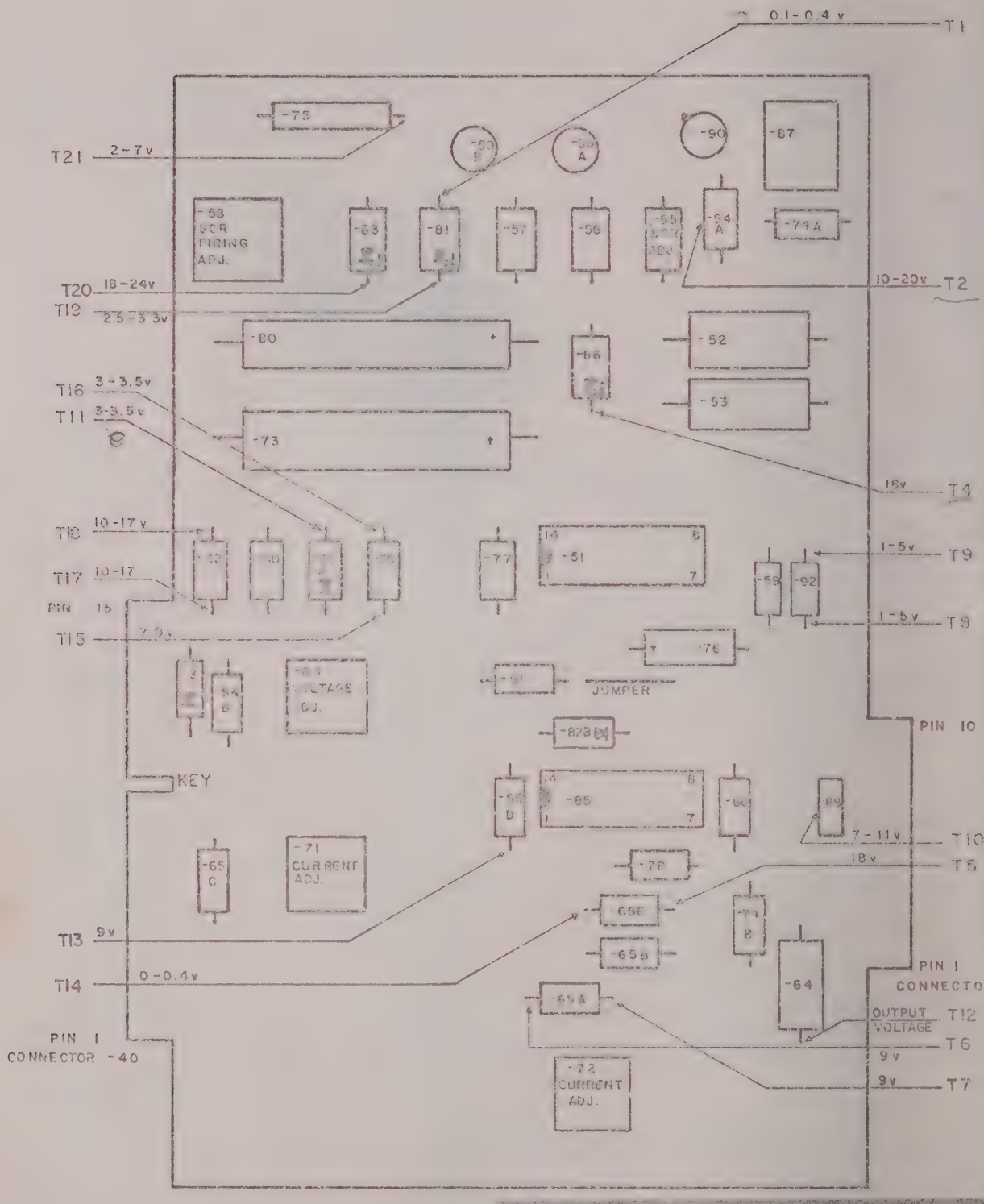
NO.	DESCRIPTION	QTY.
-1	Power transformer, Ratelco 2045A	1
-2		
-3	Diode, Semtech SI-6	3
-4	SCR, Syntron 35C10F	2
-5	Transistor, 2N3055 or 2N6254	1
-6	Transistor, 2N3055 (Matched) or 2N6254	4
-7		
-8	Power cord, Miller 04949	1
-9	Fan, Granger, 3M109, w/2C953 blade	1
-10	Pilot light assembly, Leecraft 32R-2513	1
-11	Thermostat, Elmwood, 2450-21-20	1
-12	Fuse, Buss MDL 15	1
-13	Fuseholder, Buss HKP	1
-14	Switch, Carling 2FA53	1
-15	Jack, Smith, 286-102, red	1
-16	Binding post, 257, red	1
-17	Binding post, 257, black	1
-18	Jack, Smith 286-103, black	1
-19	Capacitor, 0.05 mFd., 500V	2
-20		
-21	Resistor, 0.1 Ω, 5W, WW	8
-22	Resistor, Nichrome wire, 18 ga., 6"	1
-23	Resistor, 1 Ω, 1W, ±10%, type BWH	4
-24	Resistor, 100 Ω, ½W, ±10%	1
-25	Capacitor, 2 x 0.01 mFd., 1.4kV	1
-26	Capacitor, 2 x 0.01 mFd., 1.4kV	1
-27	Capacitor, 500 mFd., 50V	1
-28	Resistor, 500 Ω, 10W	2
-29	Mounting bkt., Capacitor, Mallory VR-12	1
-30	Heatsink, Ratelco 900-7	2
-31	Knob, Smith 2392	2
-32	Handle, Amerock A-459-26	2
-33	Frontplate, main, Ratelco	1
-34	Frontplate, control head, Ratelco	1
-35	Enclosure, control head, Ratelco	1

Ratelco INC 610 PONTIUS AVE NO SEATTLE, WASH. 98109

REV. NO. 6 DWN EJ CKD PM DATE 3-23-70

NAME D.C. POWER SUPPLY PS-9 (Motorola Model S-1303A-1)

SHT 1 OF 4 PART NO. 2079A



NOTES: 1) VOLTAGES ARE GIVEN IN VDC ±10% UNLESS NOTED.

PART NO. 2150E	CIRCUIT BOARD LAYOUT, COMPONENT SIDE
SHEET 1 OF 1	
DATE 12-4-72	
DRAWN BY	CHECKED BY
SCALE NONE	
NO.	

Patelco INC 610 POINTUS AVE. SEATTLE, WASH.

PARTS LIST

D.	DESCRIPTION	QTY.				
	Power transformer, Ratelco 2045A	1				
	Diode, Semtech SI-6	3				
	SCR, Syntron 35C10F	2				
	Transistor, 2N3055 or 2N6254	1				
	Transistor, 2N3055 (Matched) or 2N6254	4				
	Power cord, Miller 04949	1				
	Fan, Granger, 3M109, w/2C953 blade	1				
0	Pilot light assembly, Leecraft 32R-2513	1				
1	Thermostat, Elmwood, 2450-21-20	1				
2	Fuse, Buss MDL 15	1				
3	Fuseholder, Buss HKP	1				
4	Switch, Carling 2FA53	1				
5	Jack, Smith, 286-102, red	1				
6	Binding post, 257, red	1				
7	Binding post, 257, black	1				
8	Jack, Smith 286-103, black	1				
9	Capacitor, 0.05 mFd., 500V	2				
0						
1	Resistor, 0.1 Ω, 5W, WW	8				
2	Resistor, Nichrome wire, 18 ga., 6"	1				
3	Resistor, 1 Ω, 1W, ±10%, type BWH	4				
4	Resistor, 100 Ω, ½W, ±10%	1				
5	Capacitor, 2 x 0.01 mFd., 1.4kV	1				
6	Capacitor, 2 x 0.01 mFd., 1.4kV	1				
7	Capacitor, 500 mFd., 50V	1				
8	Resistor, 500 Ω, 10W	2				
9	Mounting bkt., Capacitor, Mallory VR-12	1				
0	Heatsink, Ratelco 900-7	2				
1	Knob, Smith 2392	2				
2	Handle, Amerock A-459-26	2				
3	Frontplate, main, Ratelco	1				
4	Frontplate, control head, Ratelco	1				
5	Enclosure, control head, Ratelco	1				

Ratelco INC 610 PONTIUS AVE NO SEATTLE WASH. 98109

REV. NO. 6 DWN EY CKD RM

DATE DATE 3-23-70

NAME D.C. POWER SUPPLY PS-9 (Motorola Model S-1303A-1)

SHT 1 OF 4 PART NO. 2079A

PARTS LIST

NO.	DESCRIPTION	QTY.
-36	Enclosure, main, Ratelco	1
-37	Cover, Ratelco	2
-38	Feet, Smith 2194	4
-39	Connector, Elco 00-6007-010-940-002	1
-40	Connector, Elco 00-6007-015-940-002	1
-41	Spacer, Wakefield 106	4
-42	Plug, Smith 285-102, red	1
-43	Plug, Smith 285-103, black	1
-44	Resistor, 15 Ω, ½W, ±10%	2
-45	Capacitor, 22,000 mFd., 50V	1
-46	Cable, Belden 8747, 6 pair, 36"	1
-47	Resistor, 250 Ω, 20W, ±10%	1
-48	Printed circuit board, meter, Ratelco 2073B	1
-49	Printed circuit board, Ratelco 2150EA	1
-50	Transistor, 2N3394	2
-51	Integrated circuit, μA723C, dip	1
-52	Resistor, 470 Ω, 2W, ±10%	1
-53	Resistor, 1k Ω, 2W, ±10%	1
-54	Resistor, 560 Ω, ½W, ±10%	2
-55	Trimmer, Mallory MTC 252L1, 2.5k Ω, ¼W	1
-56	Resistor, 15k Ω, ½W, ±10%	1
-57	Resistor, 330 Ω, ½W, ±10%	1
-58	Trimmer, Mallory MTC 53L4, 5k Ω, ¼W	1
-59	Resistor, 2.2k Ω, ½W, ±10%	1
-60	Resistor, 2.2k Ω, ½W, ±10%	1
-61	Choke, Airco 17N-10, 10 μH	2
-62	Resistor, 18k Ω, ½W, ±10%	1
-63	Trimmer, Mallory MTC 252L4, 2.5k Ω, ¼W	1
-64	Resistor, 100 Ω, 2W, ±10%	1
-65	Resistor, 3.3k Ω, ½W, ±10%	5
-66	Resistor, 10k Ω, ½W, ±10%	1
-67	Spacer, Weckesser, SP-102, ¼"	4
-68	Spacer, Weckesser, SP-126, 5/8"	4
-69	Spacer, Smith, 2105	2

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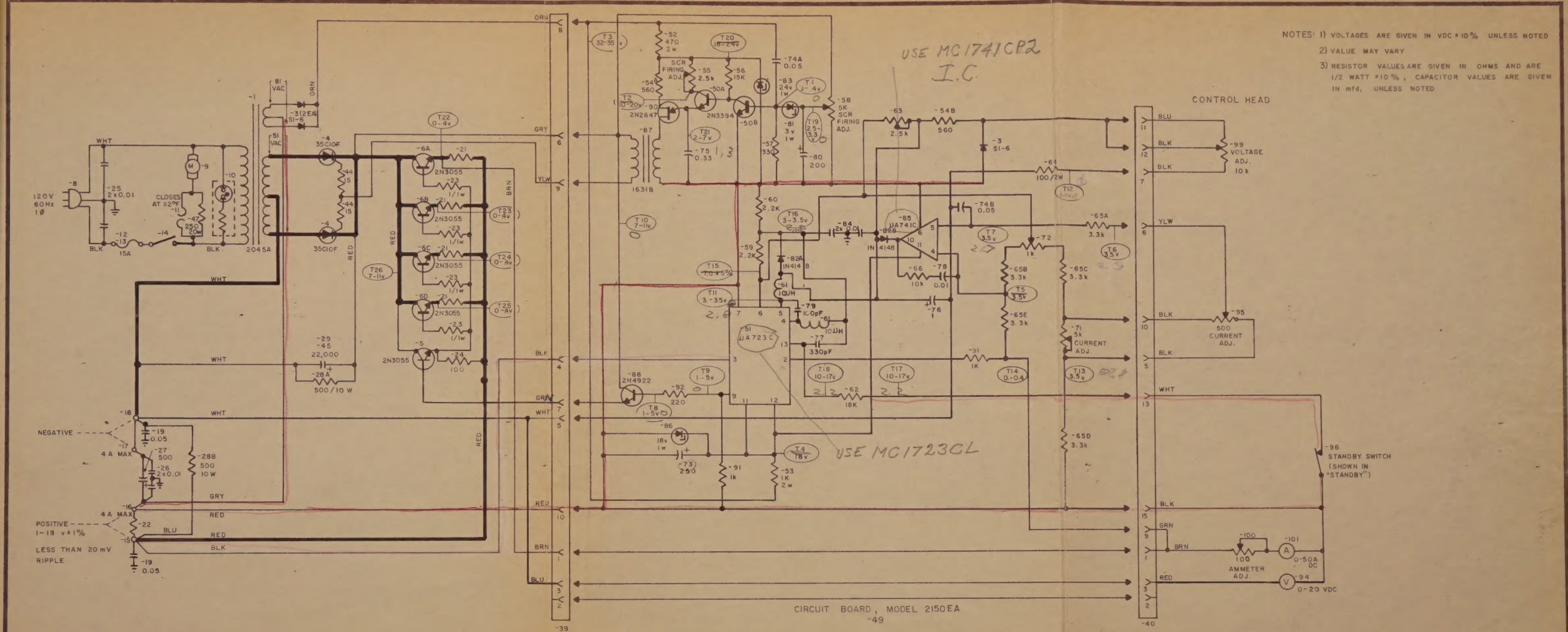
REV. NO. 7 DWN CKD DATE DATE 3-23-70

NAME D.C. POWER SUPPLY PS-9 (Motorola Model S-1303A-1)

SHT 2 OF 4 PART NO. 2079A



PART NO. 2079A	NAME DC POWER SUPPLY TYPE: PS-9 (MOTOROLA MODEL: SI303A-1)
SHEET 4 OF 4	
DATE 12-22-69	
DRAWN DET / CHECKED BW	FOR MOTOROLA
SCALE NONE	
REV. NO. 11 / DATE 6-11-74	Ratelco INC 610 PONTIUS AVE. NO. SEATTLE, WASH. 98109

Ratelco, INC.

Founded in 1945 as Radio Telephone Service Company, RATELCO was the first Motorola 2-way radio service station in the United States. Today, the sale of parts and the servicing of mobile radio systems continue to be important functions of the corporation.

As the service business grew, founder Phil Duryee became aware of certain accessory items needed by RATELCO customers. Since these products were not then available commercially, Duryee, an electrical engineer, began designing and making the accessories himself. As more customers approached him with similar needs, it became evident these items could be manufactured and sold in quantity. Manufacturing facilities and personnel were added and RATELCO became a manufacturer as well as a service organization.

Others learned of RATELCO accessories and sought help in developing products to meet their special needs. Today RATELCO designs and manufactures such products as precision automatic battery chargers, high current DC power supplies, alternator power converters, cathodic protection controllers, mobile intercoms and communication antennas and accessories.

Ratelco facilities, housed in an 18,000 square foot building, include equipment for making chassis and enclosures, painting, baking, transformer winding, electronic assembly and testing. This gives maximum control over quality and delivery as well as flexibility for custom manufacturing.

A number of RATELCO designed products are manufactured as private label equipment for sale by major national firms.

RATELCO experience and facilities are available to you, too. Tell us your requirements. We look forward to working with you.

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